Projected Accomplishments for FY 2017
State Priorities Concerning Environmental Indicators

The Pesticide Bureau has collected field data regarding pesticide complaints for nearly three decades. The criteria used to determine state priorities for the pesticide enforcement program is reviewed and modified periodically and when new needs arise, to improve predictability and performance of existing indicators as well as introduce new categories. However, no new categories were introduced during this reporting period.

The methodology employed to analyze environmental indicator data has not changed significantly in recent years. While the reporting system is reviewed periodically, the methods used have yielded the necessary data to identify priorities regarding the cases investigated by the Bureau and to examine trends in pesticide use. Additionally, this practice helps to minimize the administrative resources invested in coding the outcomes of these investigations.

This document details the projected outputs for FY 2017 based on the data compiled from 2011 through 2015 crop years. Evaluating data with respect to prior-year outputs is useful to determine if priority modifications would be necessary for the project year 2017. While no priority modifications were identified for FY 2017, minor changes could take place in response to regulatory and market conditions, detailed in sections A through F of this report. Table 1 presents a comparison between the priority-area rankings for the years 2016 and 2015. No changes were observed and all weighted priority rankings are identical for both years, thus suggesting the trends observed during the previous reporting period have remained constant.

Table 1: Results for the weighted priority-area rankings for FY 2016 and FY 2015.

Priority Area	**2016 Weighted Priority Ranking** **based on crop years 2011-2015**	**2015 Weighted Priority Ranking** **based on crop years 2010-2014**
Ground Herbicide Drift	1	1
Food/Feed/Water Residues	2	2
Aerial Fungicide Drift (≥2006)	3	3
Aerial Insecticide Drift	4	4
Restricted Use Pesticides	5	5
Non-Commercial Applicators	6	6
Non-Phenoxy Herbicide Drift	7	7

Table 2 shows a comparison between the trends set by the 5-year average percentages for the cases investigated in FY 2016 and the weighted priority rankings. Specifically, Table 2 highlights the different results observed when the weighting factors are used in the calculations, which are shown in the third column. To calculate the 5-year average percentages, the number of incidents for each incident type is divided by the total number of incidents over the 5-year period. The weighted priority rankings are calculated as the product of the 5-year average percentages times the weighting factor, so they are not just a function of incident frequency. The weighting factors are assigned proportionally to align the calculation of the weighed priority ranking with respect to the Bureau's goals; this way, a comparison takes place considering the number of incidents reported for each incident type and the relative importance or significance assigned to each incident type. For instance, Food/ Feed/ Water Residues has a weighting factor of 33 and it has a percentage of 11.41% (64 incidents over the past five years, Σ = 561, [(64/561)*100=11.41%]. It follows that the weighted priority ranking would be calculated as the product of 33 * 0.1141 = 3.76, which is to be compared to the 10.09 value observed for ground herbicide drift (283 incidents and a factor of 20; that is, a higher number of incidents with a lower degree of severity or significance to the Bureau). Figure 1, located on page 15 of this report, illustrates graphically the same data presented in Table 2 and compares results collected over the last five years.

Table 2: Calculation of the Weighted Priority Rankings and 5-Year Average Percentages and Trend Comparison for FY 2016.

Priority Area	2016 Weighted Priority Ranking	Raw Priority Values	5-Year Average Percentage**	Weighting Factor	5-Y No. Incidents
Ground Herbicide Drift	1	10.09	50.45%	20	283
Food/Feed/Water Residues	2	3.76	11.41%	33	64
Aerial Fungicide Drift (≥2006)	3	3.38	13.01%	26	73
Aerial Insecticide Drift	4	2.70	9.63%	28	54
Restricted Use Pesticides	5	2.33	33.33%	7	187
Non-Commercial Applicators	6	1.91	19.07%	10	107
Non-Phenoxy Herbicide Drift	7	1.70	42.60%	4	239

**Note: The 5-year average percentage is based on misuse complaints, not total codes. For this reason, the values shown in this table do not add up to 100.

The priority ranking calculation has remained constant since it was modified in 2011 when a new reporting code was introduced to address reporting requirements concerning violations to Iowa's revised "Bee Rule". The revised rule, effective January 22, 2009, does not require prior notification to registered apiaries; instead, it prohibits the application of pesticides labeled as toxic to pollinating insects during the primary foraging hours from 8 am to 6 pm for all target fields located within one mile of registered bee hives. Moreover, commercial application records require logging beginning and ending times for all applications, and not just those associated with products labeled as toxic to bees. The priority code for "Bee Kills" remains as

a separate code, since not all cases alleging a violation of the bee rule result in bee kills, and not all bee kills are caused by a violation of the Iowa Bee Rule (21 IAC 45.31).

At the time fungicide drift codes were added, the environmental impact of fungicide use had not been determined. Therefore, the potential for phytotoxicity and residues on nontarget crops was a concern and this was a major consideration when assigning the weighting factors for these reporting codes. Since then, it has become evident that there may other factors regarding fungicide drift, including both ground and aerial, which may impact surface water quality, exposure to nontarget food crops, and aquatic organisms. Human health risks due to exposure to fungicide drift were also factored into the priority rankings.

The assignment of rankings first considered the significance of potential adverse human health effects, potential for contamination of food/feed/water, exposure to other living organisms including pollinators, and effects of exposure to crops and the environment. "Personal Health" ranks highest in this scheme, since this would indicate that a person sought medical attention following a pesticide exposure incident. Pest control operators also rank high in this priority list because of their applications in residences, daycare centers, nursing homes, schools, etc., all of which presents a potential for human exposure to pesticides in these areas. Lawn care operators also rank relatively high in this rating because of their use of pesticides on areas frequented by humans, such as lawns, athletic fields, and parks. Aerial drift of pesticides and water quality protection issues were moved up in the rankings due to potential for widespread human exposure and/or potential long-term effects, including acute and chronic effects.

In keeping with the national focus areas identified in the 2017 performance partnership grant, the Iowa Department of Agriculture and Land Stewardship (IDALS) has evaluated the incident reports for the past five years and is prepared to make the commitments outlined in the following sections regarding enforcement outputs under the PPG. Investigators will be instructed concerning the number and type of investigation needed to satisfy enforcement and/or environmental targets, as defined for each priority area. While this report is dedicated to discuss only the priority areas, Table 7, located in page 14, presents a summary of areas being tracked by IDALS Pesticide Bureau.

A. Exposure of Herbicides to Nontarget Areas (drift)

An evaluation of all misuse (follow-up) investigations suggests that exposure of nontarget areas to herbicides remains the single most common source of complaints of pesticide misuse in Iowa, with 50.45% percent of the total complaints filed over the past five years, as indicated in Table 2. The primary focus of herbicide drift complaints has been toward commercial agricultural applications, with non-phenoxy herbicide drift complaints once again dominating the number of drift complaints filed with 42.60%, as shown in Table 2. While the net number of incidents in this classification for 2015 was 34, which is below the 5-year average of 48, this may be caused by the delays in enforcement data tracking caused by the staffing changes that took place at the Pesticide Bureau in 2015 and is not a reflection of pesticide use trends in Iowa. Nevertheless, the four active ingredients (AI) most commonly found in drift incidents

remain the same as last year, including: Atrazine, the Potassium salt of N-(PhosphonoMethyl) Glycine, Glyphosate [*aka*, N-(PhosphonoMethyl) Glycine], and 2,4-D. Table 3 presents a counts-list of the most commonly found AI in drift incidents (see Table 8 for additional AI). Together, glyphosate and its potassium salt rank No. 1 (173 incidents), atrazine ranks second (103) and 2,4-D ranks third (76). The use of glyphosate in combination with other pesticides in early spring during pre-planting, as well as its use on genetically modified (GMO) corn and soybeans post-emergence, appears to be a significant factor to account for the high frequency of glyphosate and its derivatives in agricultural drift incidents. For this reason, laboratory analysis of the samples collected during these investigations has become more complex and it often requires additional resources to analyze the various herbicide combinations being used to combat herbicide resistance in weeds, often resulting in 2-6 AIs being tested for each sample.

Table 3: Summary of the Number of Drift Incidents Involving the Most Commonly Used Herbicide Active Ingredients. Here, *Phenoxy* Refers to Benzoic Acid and Phenoxy Group 4 Growth Regulator Herbicides (Site of Action).

Active Ingredient Name	**5-Year Total**	**2015**	**2014**	**2013**	**2012**	**2011**
ATRAZINE (ANSI)	103	22	17	37	19	8
GLYCINE, N-(PHOSPHONOMETHYL) POTASSIUM SALT	87	19	20	24	13	11
GLYPHOSATE	86	13	15	20	23	15
2,4-D	***76***	12	13	18	18	15
ACETOCHLOR	52	13	6	15	11	7
DICAMBA (ANSI)	***41***	10	4	7	8	12
MESOTRIONE	34	6	6	9	5	8
FLUMIOXAZIN (ANSI)	28	6	11	7	4	0
S-METOLACHLOR (ACETAMIDE)	25	5	6	5	3	6
FLUMETSULAM	24	8	1	4	8	3
ISOXAFLUTOLE	21	4	2	11	3	1
SULFENTRAZONE (METHANE SULFONAMIDE)	19	3	2	3	11	0
CLOPYRALID, MONOETHANOLAMINE SALT	18	4	1	4	5	4
THIFENSULFURON-METHYL	18	1	9	5	3	0
2,4-D 2-ETHYLHEXYL ESTER	***17***	2	5	7	3	
CLORANSULAM-METHYL	17	3	2	3	8	1
SALFLUFENCIL	17	0	3	4	10	0
CHLORIMURON ETHYL	16	2	7	5	2	0
IMAZETHAPYR	15	1	2	2	8	2
CLETHODIM	14	1	2	5	1	5
FOMESAFEN (ANSI)	14	3	5	3	3	0
MCPP	***14***	3		1	4	6
TEMBOTRIONE	14	1	6	4	3	0
DIMETHENAMIDE-P (ACETAMIDE)	10	0	2	2	6	0
NON-PHENOXY TOTAL	632					

PHENOXY TOTAL	***148***					

Currently, the focus of Iowans has shifted to herbicide drift in general, with no particular emphasis on phenoxy or restricted use herbicides. However, this trend could change if crops tolerant to 2,4-D and/or Dicamba are adopted by Iowa farmers in the near future. Additionally, IDALS anticipates that an increase in incident reports of herbicide injury to ornamental plants and sensitive crops could occur, as both rural and urban dwellers become less tolerant to herbicide use "accidents". Iowa has also seen an increase in the number of farms interested in Non-GMO and organic farming; therefore, increasing the acres of farmland dedicated to non-glyphosate tolerant species augments the odds of observing herbicide injuries in this category. Included are a variety of sensitive crops such as vineyards and small-scale fruit and vegetable production, in addition to traditional row-crop farming of organic and non-GMO species. Some of these activities may qualify to receive incentives as part of agricultural diversification programs. Collectively, all these trends may create additional demand for the compliance and enforcement services offered by the Pesticide Bureau.

The number of complaints involving lawn care operators (LCOs) continue to fluctuate over the past five years, ranging from 3 to 17. Allegations filed against LCOs historically refer to application of pesticides in windy conditions, failure to pre-notify, application to the wrong property, and/or failure to comply with license and certification requirements.

Incidences of ground herbicide drift (GHD) rank at the top of the priority list for both the number of complaints filed and the weighted percentages (see Table 1 and Table 2). Crop year 2000 (not shown in the breakdown) is historically the highest year on record, with 119 complaints filed concerning GHD. The number of complaints for GHD has dropped significantly since then to 45 to 76 complaints over the past five years.

Occasionally, enforcement actions in this area may be complicated by vague or unenforceable drift precautionary statements in the labels of some of the products being applied. IDALS is committed to identify those cases of labeling language in need of improvement and to forward those labels to the EPA SLITS data system review as they are identified, thus facilitating the implementation of improvements in new labels.

In an effort to prevent the occurrence of incidents related to herbicide drift, investigators will be instructed to continue surveillance of applications, particularly in agricultural, lawn, and right-of-way applications of herbicides during their respective peak-use seasons, since some may be tempted to perform application even under windy conditions that favor drift to susceptible areas. To accomplish this, the goal is to complete 33 agricultural and 8 non-agricultural use monitor inspections in FY 2017, with a fraction of them focused on herbicide drift prevention.

Concerning routine records inspections, pesticide investigators routinely screen applicator records and document any indication that herbicides may have been applied using methods or under weather conditions that favor drift. They also collect product labels and/or photographs of the pesticides included in their investigations, as needed to document noncompliance and to support enforcement actions such as: advisory letters, warning letters, and civil penalties.

Because the percentage of drift complaints attributed to agricultural applications is generally 50% or more, the total projected applicator records inspections aimed to agricultural applicators will be at least 50%. The remaining portion will be split among Lawn Care, Right-of-Way, Public, Pest Control, and Golf Course applicators.

IDALS also participates in public outreach and education efforts in partnership with public and/or trade organizations, professional associations, and educational institutions such as the Iowa Agribusiness Association, Iowa Aerial Applicator's Association, Iowa Turf Grass Office (which includes the Iowa Turf Grass Institute, Iowa Golf Course Superintendents Association, Iowa Sports Turf Managers Association, Iowa Professional Lawn Care Association), and Iowa State University Extension Service. During these activities, IDALS personnel has been directed to emphasize opportunities to adopt pesticide drift reduction technologies and practices in conferences, conventions, special presentations, and meetings, as much as staff time permits.

B. Food/Feed/Water Residues

This area appears second on the rank analysis (see Table 1 and Table 2) because of the concerns and the potential impact of pesticide residues on food/feed/water. Therefore, this category was given a higher priority when weighting factors were assigned, which also influences how complaints are processed by office, laboratory, and field staff. Complaints flagged with this priority may include those commodities that are still in the growing season, but not with a focus on maximum acceptable levels of pesticide residues on agricultural products, which is a function of the USDA. Another key area includes alleged pesticide exposures to certified organic, sensitive crops (i.e. vineyards, orchards, and horticultural gardens), and non-GMO agricultural crops. This sector has received much discussion about pesticide-related incidents over the past few years and the Pesticide Bureau is actively monitoring stakeholder initiatives on both side of the aisle to promote dialog and to offer compliance assistance, as best we can with available resources.

We will attempt to meet our objectives in this area by working closely with other governmental agencies, when appropriate, including the FDA, USDA, IDALS Agricultural Diversification & Market Development Bureau (Organics Program), Iowa State University Extension Service, the State Veterinarian, as well as the Institute of Agricultural Medicine. Overall, IDALS' intent is to gather information regarding each incident reported to us in an effort to identify the most probable sources of contamination and to determine if the presence of residues is due to pesticide misuse. These objectives guide the assignment of enforcement activities and may aid to make recommendations or to suggest training in areas known to have a high prevalence of misuse incidents.

Conversely, the Pesticide Bureau may receive referrals about cases involving pesticide residues in commercial food commodities from other governmental agencies that may have already initiated or completed their own incident investigation, or a portion of it under their

jurisdiction. In those cases, IDALS will collaborate with these agencies, request a summary of their findings, and determine if further investigations are needed on our end.

As for pesticide exposure to certified organic crops and specialty crops, IDALS Agricultural Diversification and Market Development Bureau introduced a voluntary registry for sensitive crops in 2008 crop year. The goal of this effort is to provide a platform to inform pesticide applicators about the sensitive crops present in the areas where they work. They also developed "No Spray" field signs to warn applicators about the presence of non-tolerant plant species in the vicinity of application target areas. While applicator participation in this program is strictly voluntary, responsible applicators, especially those who may not be familiar with a new application site, take advantage of this resource and implement additional precautions during their application to avoid drift incidents. This year, Iowa is expected to transition from the Sensitive Crop Directory to Driftwatch, which results from the collaboration between the non-profit Fieldwatch and Purdue University. Changes will be communicated to the EPA Regional Office when they become effective.

The main goals in this area are to monitor trends, explore factors to explain why the number of food, feed, and water-related complaints have not decreased over the years, and to bring awareness to stakeholders in these production communities about measures to reduce the risk of pesticide drift incidents affecting their operations.

Through marketplace, dealer, and use inspections, IDALS continues to look for pesticides that may have been suspended, canceled, or banned by EPA and still remain a threat to food, feed, and water due to their high toxicity. Diazinon and chlorpyrifos products remain on the priority list to monitor during marketplace inspections, particularly regarding their use in apples, tomatoes and grapes. Over the past five years, eight products have been found in the suspended/banned/canceled category, with one instance in 2011, another in 2012, and six in 2013.

Investigators and enforcement personnel routinely verify compliance with water quality protection initiatives and product label requirements. Protection of water quality efforts may also include reviewing atrazine sales data and targeting firms for inspections in areas where average sales appears to be high, especially if these areas include counties or townships designated as atrazine management areas. Additionally, IDALS may also monitor concerns about label water quality protection statements, as well as usage of any pesticide with labeling that includes water quality protection precautions. These will be incorporated as part of in-depth records inspections and other types of investigations, on a case-by-case, depending on the availability of opportunities and resources.

C. Aerial Fungicide Drift (AFD)

Complaints of aerial fungicide drift continue to hold a high position in the priority rankings since the tracking code was implemented for the 2008 crop year. Because of the potential exposure to humans, water retention areas, organic and specialty crops along with other nontarget

areas, a relatively high priority factor was assigned to this category since 2009. As predicted, this priority area has continued to hold a ranking in par with Aerial Insecticide Drift (See Table 1 and Table 2). This trend has been fueled by high market prices for corn and production practices that make it economically feasible to apply preventive fungicide treatments to field corn. However, it is conceivable that the abrupt fall of corn prices that took place in the commodity markets over the past two years may force producers to reduce their use of fungicides to cut operational cost if prices remain low (Trade Economics 2016). Moreover, the economic benefit of prophylactic fungicide use in terms of net yield improvement (in bushels/acre) has been debated (Wallheimer 2011) and (Robertson and Shriver 2015). Table 4 presents a count report of the active ingredients involved in AFD misuse cases handled by the Bureau during the five-year period under consideration.

Table 4: Summary of the Number of Drift Incidents Involving the Most Commonly Used Fungicide Active Ingredients.

Active Ingredient Name	5-Year Total	2015	2014	2013	2012	2011
PYRACLOSTROBIN	39	1	4	10	12	12
TRIFLOXYSTROBIN	15		5	3	3	4
PROTHIOCONAZOLE	14		5	3	3	3
AZOXYSTROBIN	13		2	4	3	4
METCONAZOLE	12		2	5	4	1
PROPICONAZOLE (AG)	10		2	3	1	4
CHLOROTHALONIL (ANSI)	1				1	
MANCOZEB (AG)	1				1	
PICOXYSTROBIN	1		1			
TETRACONAZOLE	1				1	

Complaints of aerial fungicide drift during the past year have included alleged general exposure complaints to property, organic crops, beehives, nontarget crops such as orchards and most importantly, exposure to humans either directly or through drift, as result of applications over farmsteads, roads, and other areas where humans were present.

Section D of this document will expand on the importance of improving communication and the flow of information to the industry trade group that perform these applications. Also, efforts to educate these applicators about the need to avoid exposure to nontarget areas must continue. IDALS also plans to conduct at least one use monitor inspection targeted toward the aerial application of fungicides and/or insecticides during the project year, as well as targeting at least 12 applicator records inspections to aerial applicators, as explained in section D.

Another issue affecting enforcement actions against applicators where AFD has occurred is the lack of concise labeling language prohibiting drift and/or exposure of spray to nontarget areas. Label review of precautionary statements at EPA/OPP appears to be focused on

aquatic areas at the expense of other nontarget areas. IDALS will continue to bring up what appears to be insufficient label statements to the attention of EPA through the SLITS data system.

More specifically, some research studies suggest that fungicide use may impact pollinators. For instance, a study performed by a research group from Maryland University found evidence that fungicide exposure makes bees more susceptible to the gut parasite *Nosema ceranae* and that insects with weakened immune systems may turn very ill later on. In this study, bees consuming pollen with higher fungicide loads were three times more likely to be afflicted by *Nosema* infections, particularly for Chlorothalonil and Pyraclostrobin. It is also significant that fungicides were present at high levels in both crop and non-crop pollen collected by bees foraging in agricultural areas (Pettis et al. 2013). These results are noteworthy because Pyraclostrobin is widely used in Iowa, as indicated in Table 4. For this reason, the Bureau is committed to track any pollinator incident that may be linked to fungicide use.

D. Aerial Insecticide Drift (AID)

The potential risk for adverse human health effects, surface water contamination, relatively large exposure areas, and the risk to specialty and certified organic crops due to potentially illegal pesticide residues in food and feed were the main factors considered when assigning the ranking factor for AID (See Table 2). Additionally, potential adverse effects to pollinators as result of exposure to insecticides labeled as toxic to bees is a factor that is now gaining relevance and has received attention during the definition of priorities for this category.

Table 5: Summary of the Number of Drift Incidents Involving the Most Commonly Used Insecticide Active Ingredients.

Active Ingredient	Neonicotinoid	5-Y Total	2015	2014	2013	2012	2011
CHLORPYRIFOS (ANSI)	No	23		4	5	12	2
BIFENTHRIN (ANSI)	No	16		1	6	8	1
CYHALOTHRIN, LAMBDA	No	14	1	1	5	4	3
CYHALOTHRIN, GAMMA	No	9		2	2	3	2
ZETA-CYPERMETHRIN	No	8			1	4	3
IMIDACLOPRID	Yes	3				1	2
THIAMETHOXAM	Yes	3	1				2
PERMETHRIN, MIXED CIS,TRANS (ANSI)	No	2			1		1
ALLETHRIN	No	1				1	
BETA CYFLUTHRIN	No	1					1
CARBARYL (ANSI)	No	1			1		
CLOTHIANIDIN	Yes	1			1		
ESFENVALERATE	No	1				1	

Complaints of aerial insecticide drift during crop year 2015 included alleged exposure to humans and vehicles traveling public roads, as well as general exposure to nontarget areas

such as pastures, hay fields, ornamentals, beehives and home gardens. For example, there were two high-priority incidents reported in 2013 involving alleged indirect exposure to a school bus and to the individuals that were participating in a crop field day event.

The Bureau's primary concerns included reports of alleged direct human contact, either directly or through drift, as result of applications over farmsteads, roads, and other areas where humans were present. Reports were also received alleging application within one mile of a registered apiary during prohibited hours of application. Summary of these incidents are captured in a separate pollinator summary report submitted to beekill@epa.gov in December, 2015. IDALS plans to submit the FY2017 project year summary of alleged pollinator exposures in the same fashion for crop year 2016 via beekill@epa.gov.

Increased communication with the industry trade group appears to be an appropriate first step in attempting to educate applicators about the need to avoid exposure to nontarget areas, including the continued participation of the Bureau at the Iowa Agricultural Aviation Association meetings, which includes certification training and other oral presentations to help aerial applicators comply with pesticide regulatory requirements relevant to their commercial endeavors. IDALS also plans to conduct at least one use monitor targeted toward the aerial application of insecticides during the project year as well as targeting at least 12 applicator records inspections to aerial applicators.

Also, as explained in section C, lack of concise labeling language prohibiting drift and/or exposure of spray to nontarget areas in product labels may be a barrier in some cases under this classification and specific examples will be submitted to EPA through the SLITS data system as they arise.

E. Sale/Distribution/Use of Restricted Use Pesticides (RUPs)

This area of concern was identified as the Number Five priority based on the number of misuse complaints involving the use of RUPs (See Table 2). The rating of complaints by the five year percentage average indicates 33 percent of all misuse cases filed involving a restricted use pesticide. The major focus of complaints filed linked to RUP's has been problems regarding aerial insecticide drift, as most agricultural-use insecticides are classified as RUP's. Additionally, RUP herbicides applied by ground commercial and private applicators included alleged drift or overspray to home gardens, ornamental plantings, and presumed direct or indirect human exposure.

The Bureau is proposing to continue with the existing inspection program for RUP distribution and dealer records inspections during this year, aiming to conduct 84 inspections, some of which may include follow up. There is a proposed minimum to document at least three instances of dealer records indicating a potential distribution of an RUP to an uncertified applicator. Another option available is to issue written official notices to those individuals who appear to have improperly purchasing RUP's. Additionally, there may be some overlap with the efforts described in section B to conduct targeted records inspections in designated atrazine management areas to ensure compliance with rules pertaining to these atrazine management areas in the most sensitive watersheds. IDALS also plans to continue monitoring

the distribution of RUP's to verify that applicators purchasing RUP's are properly certified before purchase and apply these pesticides. Another element of this plan is to identify any potential inappropriate distribution and/or use of agricultural pesticides for urban uses.

Pesticide Dealer License Records are stored in the IDALS computer system, which is integrated with the pesticide sales database. The Private Applicator Database is also on the State LAN, so the verification of certification numbers for private applicators has been substantially improved. Field staff has been provided laptop computers to enable them to verify the status of relevant licenses and certifications during their investigations in the field and the goal is to maintain and propose improvements to this system.

F. Non-Commercial Applicators (NCA)

Iowa's field data classification of non-commercial applicators includes certified private individuals, certified employees of private companies that apply pesticides on their own property, and uncertified individuals in both groups who apply general use pesticides exclusively and do not require any certification or licensing. Traditionally, complaints against non-commercial applicators have been associated with ground herbicide drift. The percentage of complaints against non-commercial applicators peaked in crop year 2000 with 43 complaints filed. The historic average since 1988 is 27 and although annual totals for the past five year have been fluctuating, there is an overall downwards trend. Given the great diversity of this group, it is difficult to identify a single factor that dominates trends in NCA complaints. Nevertheless, it appears that above-average spring precipitation or slow/late warming in spring has a clear effect because agricultural producers (private applicators) only have a narrow window of opportunity to perform their pesticide application. For this reason, they are more likely to assume risks and spray herbicides under unfavorable weather conditions such as on windy days. These are circumstances that cannot be easily mitigated and have a potential to result in misuse incidents. The majority of remaining cases linked to non-commercial applicators involve other scenarios of ground herbicide drift or overspray. Table 6 summarizes the active ingredients most frequently involved in NCA incidents; notably, the top three active ingredients in this list include glyphosate, atrazine, and 2,4-D, in this order, which is the same trend observed in Table 3 for all ground drift incidents. Data for 2015 may be incomplete due to delays cause by staff changes at the Bureau and ongoing efforts to code all investigations will be visible in the PPG FY 2018 report.

The need for increased education in this particular area is clear; however, an efficient method to educate and train this group must include a variety of delivery options, which exceeds the Bureau's currently available resources. An initiative being considered is to make improvements to the quality and quantity of information available at IDALS website.

The Bureau will continue monitoring the quality of contents and delivery methods used during the training sessions being provided to private applicators every year, which is a condition to waive the testing requirements that private applicators currently have to fulfill every three years. Annual training sessions for private applicators may need to be updated if 2,4-D- and Dicamba-tolerant crops, such as Monsanto's Roundup Ready Xtend Soybeans, become widely available because planting these crops may lead to an increase in phenoxy herbicide use, which are prone to cause off-target drift incidents.

Table 6: Summary of the Active Ingredients Most Commonly Found in Incidents Involving Non-Commercial Applicators.

ACTIVE INGREDIENT NAME	5-Y TOTAL	2015	2014	2013	2012	2011
ATRAZINE (ANSI)	33		9	12	8	4
2,4-D	31	2	7	8	8	6
GLYPHOSATE	28	2	6	8	7	5
GLYCINE, N-(PHOSPHONOMETHYL), POTASSIUM SALT	25		11	7	4	3
ACETOCHLOR	13		6	3	2	2
DICAMBA (ANSI)	11	1	2	3	2	3
THIFENSULFURON-METHYL	10		6	2	2	
MESOTRIONE	8		2	3	2	1
2,4-D 2-ETHYLHEXYL ESTER	7	1	1	3	2	
FLUMIOXAZIN (ANSI)	7		5	1	1	

Considering that state enforcement penalties toward the private individual are limited and do not include the assessment of civil penalties, repeat offenders may be referred to EPA Region 7 office for consideration and civil penalty assessment. Warning letters to non-commercial applicators may include the request for a response, depending upon the circumstances of the complaint. A request for response may include a written explanation of how drift may be avoided in the future and what steps will be taken to ensure compliance with product labeling. This information is also factored into the Enforcement Measures data.

On the other hand, the fact that there have been very few documented repeat-offenders for pesticide misuse incidents against non-commercial applicators appears to indicate that once they are aware of the potential source of problems, corrective measures are likely taken for future pesticide applications. Therefore, this enforcement function may be considered as an educational or outreach function of the bureau that benefits non-commercial applicators in the long run.

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Table 7: Analysis of Reported Incidents for Iowa Environmental Indicators, Crop Years 2011 through 2015, (Crop Year 10/1 – 9/30) as tabulated on December 2015.

	Iowa Environmental Indicators	4/25/2016					Statistical Analysis of Reported Incidents					
		Federal Fiscal/Crop Years (10/1 - 9/30)					(stats run 12/2015)					
CODE	DESCRIPTION	2011	2012	2013	2014	2015	TOTAL	5-YR AVG	**5-YR %	Weighting Factor	Weighted Priority	Rank
09	Ground Herbicide Drift	46	64	76	52	45	283	56.60	50.446%	20	10.089	1
08	Food/Feed/Water Residues	12	11	22	15	4	64	12.80	11.408%	33	3.765	2
C6	Aerial Fungicide Drift (≥2006)	19	22	16	13	3	73	14.60	13.012%	26	3.383	3
02	Aerial Insecticide Drift	8	18	14	8	6	54	10.80	9.626%	28	2.695	4
16	Restricted Use Pesticides	26	53	57	27	24	187	37.40	33.333%	7	2.333	5
B1	NonCommercial Applicators	16	26	31	28	6	107	21.40	19.073%	10	1.907	6
B2	NonPhenoxy Herbicide Drift	39	54	66	46	34	239	47.80	42.602%	4	1.704	7
B7	Lawn Care Company	17	11	3	10	8	49	9.80	8.734%	19	1.660	8
C8	Apiary Notification Issue Only (≥2008)	5	11	10	4	0	30	6.00	5.348%	23	1.230	9
A3	Personal Health	1	10	3	2	1	17	3.40	3.030%	34	1.030	10
03	Animal Poisonings	2	3	5	8	4	22	4.40	3.922%	18	0.706	11
14	Pest Control Operators	2	3	1	2	2	10	2.00	1.783%	31	0.553	12
05	Bee Kills	2	3	6	3	0	14	2.80	2.496%	17	0.424	13
01	Aerial Herbicide Drift	3	0	3	1	2	9	1.80	1.604%	25	0.401	14
A2	Mixing Site Runoff	4	2	2	2	3	13	2.60	2.317%	16	0.371	15
06	Disasters/Spills/Including Flood	1	6	1	0	0	8	1.60	1.426%	21	0.299	16
A0	Ground Insecticide Drift	1	1	4	0	0	6	1.20	1.070%	27	0.289	17
C7	Ground Fungicide Drift (≥2006)	3	1	1	0	2	7	1.40	1.248%	22	0.275	18
B8	Worker Protection	0	1	1	2	0	4	0.80	0.713%	32	0.228	19
B3	Groundwater	0	1	2	1	0	4	0.80	0.713%	24	0.171	20
07	Farm Runoff	0	1	1	0	2	4	0.80	0.713%	15	0.107	21
C4	Urban Pest (>1998)	0	1	0	0	1	2	0.40	0.357%	30	0.107	22
C5	GMO/Biotech	16	7	5	0	0	28	5.60	4.991%	2	0.100	23
15	Product Problems	5	1	0	0	0	6	1.20	1.070%	8	0.086	24
C2	Environmental Justice	0	1	1	0	0	2	0.40	0.357%	14	0.050	25
18	Suspended/Banned/Canceled	1	0	0	0	0	1	0.20	0.178%	12	0.021	30
B4	Endangered Species	0	0	0	1	0	1	0.20	0.178%	11	0.020	31
B0	Complaint Dropped	1	4	4	0	0	9	1.80	1.604%	1	0.016	26
04	Backflushes (w/food-feed-water)	0	0	0	0	0	0	0.00	0.000%	0	0.000	27
A1	Mixing Site Drift (w/runoff)	0	0	0	0	0	0	0.00	0.000%	0	0.000	28
17	Pesticide Carryover	0	0	0	0	0	0	0.00	0.000%	9	0.000	29
19	Experimental Use Pesticides	0	0	0	0	0	0	0.00	0.000%	5	0.000	30
B5	Air Quality	0	0	0	0	0	0	0.00	0.000%	29	0.000	37
B6	Section 18 / 24(c)	0	0	0	0	0	0	0.00	0.000%	6	0.000	31
B9	Federal Facilities	0	0	0	0	0	0	0.00	0.000%	3	0.000	32
C1	Flood Related/see Diasasters	0	0	0	0	0	0	0.00	0.000%	0	0.000	33
TOTAL	REPORTED CODES	193	234	317	329	2162	1253	268.25				
	Total Misuse Cases	104	121	126	90	120	561	112.2	100%			

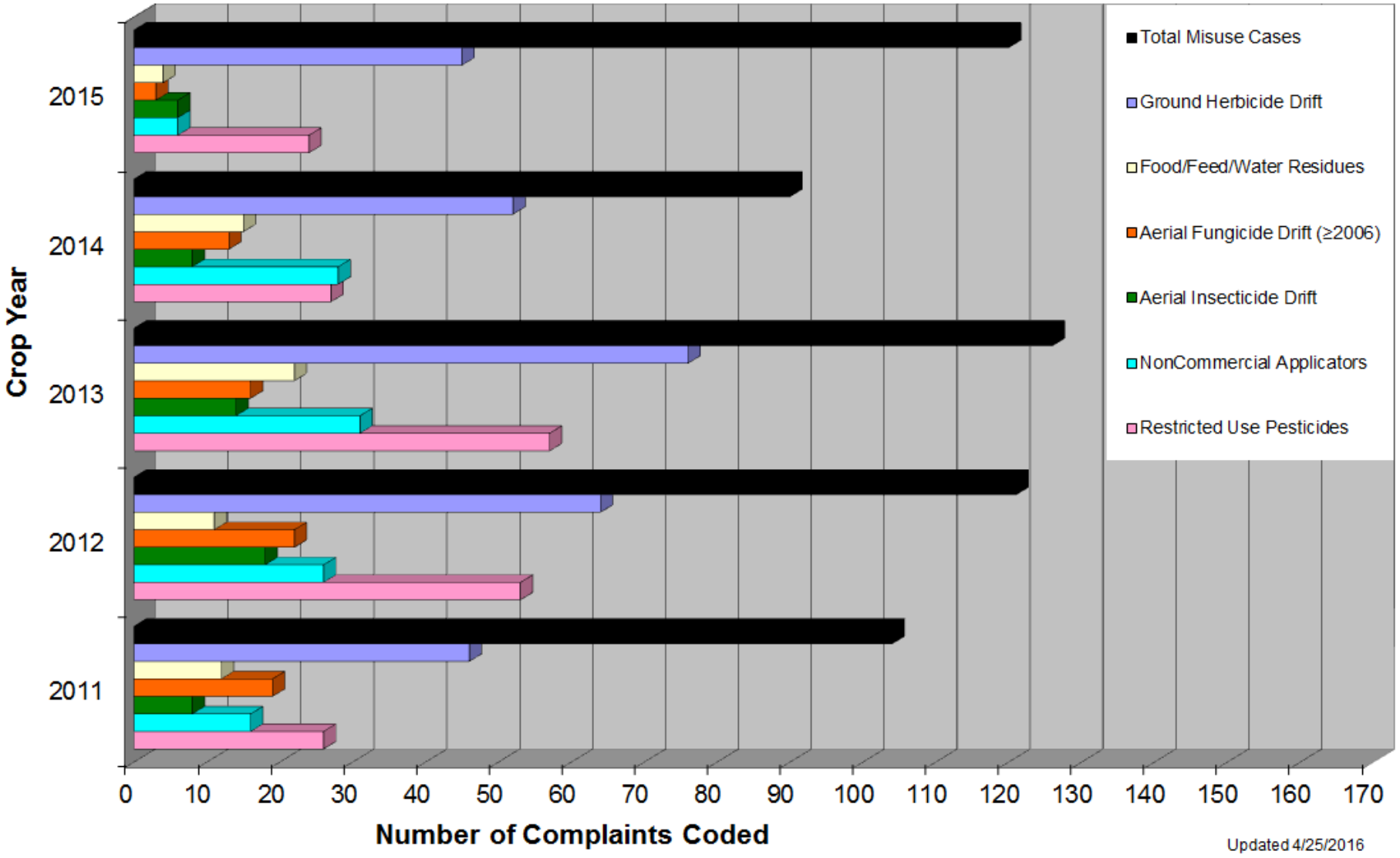

Figure 1: Top-Six Environmental Indicators for Iowa's Pesticide Follow-Up Cases during Crop Years 2011 through 2015.

Table 8: Compilation of Active Ingredients for Iowa Misuse Cases Initiated for Crop Years 2011 through 2015, (Crop Year 10/1 – 9/30) as tabulated on December, 2015.

AI_NAME	5-year Total	2015	2014	2013	2012	2011
Not Coded	146	50	24	29	20	23
ATRAZINE (ANSI)	125	30	18	40	25	12
GLYPHOSATE	112	22	17	26	28	19
GLYCINE, N-(PHOSPHONOMETHYL) POTASSIUM SALT	99	25	21	27	13	13
2,4-D	98	15	20	21	20	22
ACETOCHLOR	63	17	7	16	13	10
PYRACLOSTROBIN	60	11	6	11	15	17
DICAMBA (ANSI)	57	10	9	11	10	17
MESOTRIONE	39	9	6	10	6	8
S-METOLACHLOR (ACETAMIDE)	32	9	6	6	4	7
FLUMIOXAZIN (ANSI)	30	6	11	7	5	1
CHLORPYRIFOS (ANSI)	29	3	4	7	13	2
BIFENTHRIN (ANSI)	28	6	1	7	9	5
FLUMETSULAM	27	10	1	4	9	3
AZOXYSTROBIN	24	11	2	4	3	4
ISOXAFLUTOLE	22	4	2	12	3	1
METCONAZOLE	22	6	4	6	5	1
SULFENTRAZONE (METHANSULFONAMIDE)	22	4	4	3	11	
CYHALOTHRIN, LAMBDA	21	6	1	5	5	4
PROPICONAZOLE (AG)	21	10	2	4	1	4
2,4-D 2-ETHYLHEXYL ESTER	20	3	5	7	4	1
SALFLUFENCIL	20	3	3	4	10	
THIFENSULFURON-METHYL	20	1	9	5	3	2
CLOPYRALID, MONOETHANOLAMINE SALT	19	4	1	4	6	4
CLORANSULAM-METHYL	19	4	3	3	8	1
MCPP	19	3	3	1	6	6
TRIFLOXYSTROBIN	18	1	6	4	3	4
CHLORIMURON ETHYL	17	2	7	5	2	1
TEMBOTRIONE	16	3	6	4	3	
CLETHODIM	15	1	3	5	1	5
FOMESAFEN (ANSI)	15	4	5	3	3	
IMAZETHAPYR	15	1	2	2	8	2
PROTHIOCONAZOLE	15		6	3	3	3
DIMETHENAMIDE-P (ACETAMIDE)	13	3	2	2	6	
PICLORAM	13	1	2		6	4
ZETA-CYPERMETHRIN	12	3		1	4	4
CYHALOTHRIN, GAMMA	9		2	2	3	2
DIFLUFENZOPYR-SODIUM (SAN835H)	9	4		4	1	
FLUROXYPYR	9		1	4	2	2
METOLACHLOR (ANSI)	9	2		3	2	2
PRODIAMINE	9	1		6		2
RIMSULFURON	9	2		4		3
THIENCARBAZONE METHYL	9	2	1	5	1	
TOPRAMEZONE	9	3	1	4		1
BUTOXYETHYL TRICLOPYR	8	2	1	2	1	2
CLOPYRALID	8	5			3	
DITHIOPYR	8	1	3		1	3
FLUAZIFOP	8	3	4		1	
IMIDACLOPRID	8		3		1	4
MCPA	8	1	3		2	2
METSULFURON	8	2	1	1	3	1
SULFOMETURON METHYL (AG)	8			4	3	1

AMINOPYRALID, TRIISOPROPANOLAMINE SALT OF	7	2	3	1	1	
FLUTHIACET-METHYL	7	1	2	3	1	
GLUFOSINATE-AMMONIUM	7	2		3	1	1
TRICLOPYR	7	1	2	1	2	1
AMINOCYCLOPYRACHLOR	6	2	3		1	
PENDIMETHALIN (ANSI)	6	1			4	1
PIPERONYL BUTOXIDE (AG)	6	1	1	1	2	1
TRIISOPROPANOLAMINE 2,4-D	6		2		2	2
AMINOCYCLOPYRACHLOR POTASSIUM SALT	5					5
CYFLUTHRIN (AG)	5		1	1		3
TRIFLURALIN (ANSI)	5	2	1		1	1
CHLORSULFURON (ANSI)	4	1	2		1	
DIMETHANAMID	4		1	1	1	1
ESFENVALERATE	4	2			2	
METRIBUZIN (AG)	4	3			1	
PICOXYSTROBIN	4	3	1			
QUINCLORAC	4		1			3
THIAMETHOXAM	4	2				2
2,4-D, ISOOCTYL ESTER	3				2	1
ALLETHRIN	3			1	2	
FENOXAPROP	3			2	1	
IMAZAPYR, ISOPROPYLAMINE SALT	3	1	1		1	
LACTOFEN (ANSI)	3			2	1	
MECOPROP-P (MCPP-P)	3		1		1	1
PARAQUAT DICHLORIDE	3	1		2		
PERMETHRIN, MIXED CIS,TRANS (ANSI)	3		1	1		1
PROMETON (ANSI)	3			1	2	
QUIZALOFOP-ETHYL	3			2	1	
TEBUTHIURON (ANSI)	3	1	1		1	
TRIETHYLAMINE TRICLOPYR	3		1		2	
BETA CYFLUTHRIN	2					2
BROMACIL	2				2	
CITRIC ACID	2	1		1		
CLOTHIANIDIN	2	1		1		
CYPERMETHRIN (ANSI)	2	1		1		
DELTAMETHRIN	2				2	
DICAMBA, DIGLYCOAMINE SALT	2					2
DIQUAT DIBROMIDE	2	1	1			
MANCOZEB (AG)	2	1			1	
MCPA, 2-ETHYLHEXYL ESTER	2	1				1
NITRAPYRIN (ANSI)	2			1	1	
NONANOIC ACID	2	1	1			
TEBUCONAZOLE	2	1		1		
TETRACONAZOLE	2				1	1
ACEPHATE (ANSI)	1				1	
ACETAMIPRID	1	1				
ACIFLUORFEN (SODIUM)	1	1				
BROMADIOLONE (AG)	1				1	
BROMOXYNIL OCTANOATE	1	1				
CARBARYL (ANSI)	1			1		
CARFENTRAZONE	1					1
CHLOROTHALONIL (ANSI)	1				1	
CYTOKININ	1					1
DIFENTHIALONE	1			1		
DIURON (ANSI)	1				1	
ETOFENPROX	1				1	
FENOXYCARB	1				1	
FLUDIOXONIL	1	1				
FLUOXASTROBIN	1	1				

HALOSULFURON	1				1	
IMAZAPIC	1	1				
METALAXYL (ANSI)	1	1				
METHOMYL (ANSI)	1			1		
MGK264=N-OCTYL BICYCLOHEPTENE DICARBOXIMIDE..	1	1				
MUSCALURE AKA TRICOSENE	1			1		
MYCLOBUTANIL	1	1				
NICOSULFURON (AG)	1					1
PROSULFURON	1		1			
PYRETHRINS (AG)	1	1				
PYRIPROXYFEN (NYLAR) PYRIDINE, 2-(1-METHYL-..	1				1	
SIMAZINE (ANSI)	1					1
THIABENDAZOLE (AG)	1	1				